TRANSMITTAL OF APPEAL BRIEF (Large Entity)	Docket No. TUC920010091US1

In Re Application Of: **William F. Micka**

AUG 2 6 2005

(14914)

Application No. 10/079,458	Filing Date February 20, 2002	Examiner Mellissa M. Chojnacki	Customer No. 23389	Group Art Unit 2164	Confirmation No. 6646

Invention: **INCREMENTAL UPDATE CONTROL FOR REMOTE COPY**

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on
June 24, 2005
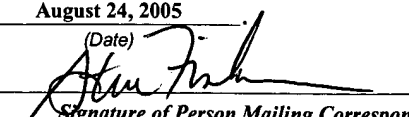
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Dated: **August 24, 2005**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	William F. Micka	**Art Unit:**	2164
Serial No.:	10/079,458	**Examiner:**	Mellissa M. Chojnacki
Filed:	February 20, 2002	**Docket:**	TUC920010091US1 (14914)
For:	INCREMENTAL UPDATE CONTROL FOR REMOTE COPY	**Date:**	August 24, 2005

Conf. No.: 6646

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APPEAL BRIEF

Sir:

INTRODUCTION

Pursuant to 35 U.S.C. § 134 and 37 C.F.R. § § 1.191 and 1.192, entry of this Appeal Brief

in support of the Notice of Appeal filed June 24, 2005 in the above-identified matter is respectfully

requested. This paper is submitted as a brief setting forth the authorities and arguments upon

which Appellants rely in support of the appeal from the Final Rejection of Claims 1-11, 13-28, 30-

34, 36-46, and 48-56 in the above-identified patent application on March 24, 2005.

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1. **STATEMENT OF REAL PARTY OF INTEREST**

The real party of interest in the above-identified patent application is International Business Machines Corporation.

2. **STATEMENT OF RELATED APPEALS AND INTERFERENCES**

There are no pending appeals or interferences related to this application to Appellant's knowledge.

3. **STATEMENT OF CLAIM STATUS AND APPEALED CLAIMS**

A. **Claim Status**

Claims 1-11, 13-28, 30-34, 36-46, and 48-56 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,446,176 to West et al. in view of U.S. Patent No. 6,643,671 to Milillo et al.

Claims 12, 29, 35, and 47 stand canceled.

B. **Appealed Claims**

Claims 1-11, 13-28, 30-34, 36-46 and 48-56 are appealed, a clean copy of which are attached hereto in Appendix A.

4. **STATEMENT OF AMENDMENTS**

The claims were not amended in the Response to the Final Rejection filed May 24, 2005.

5. SUMMARY OF INVENTION

The present application, U.S. patent application Serial No. 10/079,458 was filed on February 20, 2002, originally included Claims 1-52.

In an Official Action dated July 28, 2004, the Examiner objected to the Specification. The Examiner also rejected Claims 1-52 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,446,176 to West et al. in view of U.S. Patent No. 6,643,671 to Milillo et al.

In an Amendment and Response under 37 C.F.R. § 1.111, filed October 28, 2004, the specification and was amended to address the Examiner's objections.

Claims 1-11, 13-28, 30-34, 36-46, and 48-52 were amended to point out more clearly the claimed invention to highlight the differences between the claimed invention and the cited prior art. Further, Claims 53-56 were added, and Claims 12, 29, 35, and 47 were canceled. Moreover, the rejections of Claims 1-11, 13-28, 30-34, 36-46, and 48-52 under 35 U.S.C. § 103(a) were traversed.

In the Final Official Action, issued May 24, 2005, the Examiner Claims 1-11, 13-28, 30-34, 36-46 and 48-56 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,446,176 to West et al. in view of U.S. Patent No. 6,643,671 to Milillo et al.

In a Response under 37 C.F.R. § 1.116, filed May 24, 2005, Appellant traversed the Examiner's rejections without amendments to the claims.

In an Advisory Action issued on June 14, 2005, the Examiner essentially affirmed the rejections by making the same arguments as in the Final Office Action.

In Response to the Advisory Action, Appellant filed a Notice of Appeal on June 24, 2005.

Consequently, Claims 1-11, 13-28, 30-34, 36-46, and 48-56 are the claims on appeal. A copy of the rejected claims is attached hereto in the Appendix.

The invention with respect to claim 1 comprises a method for asynchronously transmitting one or more incremental database updates from a primary site (Fig. 1, 101) to a remote site (Fig. 1, 103), the primary site and the remote site interconnected by at least one communication link (Fig. 1, 116), the method comprising (a) destaging modified data to a first volume (Fig. 1, 106) at the primary site for a current database update and updating one or more bits in a first bitmap at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data (page 12, lines 10-27), (b) performing a first point in time virtual copy of the modified data of the first volume to a second volume (Fig. 1, 108) at the primary site by transferring the first bitmap to a second bitmap at the primary site for indicating the modified data that is to be transmitted to a third volume (Fig. 1, 122), which is at the remote site, for the current database update (page 11, lines 17-21; page 13, lines 13-19), (c) synchronizing the second volume with the third volume for the current database update by transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap (page 12, line 29 to page 13, line 22), and (d) performing a second point in time virtual copy of the modified data of the third volume to a fourth volume (Fig. 1, 124), which is at the remote site (page 12, line 29 to page 13, line 22).

The invention with respect to claim 2 comprises a method as claimed in claim 1, wherein the first bitmap represents a FlashCopy bitmap and the second bitmap represents a peer-to-peer remote copy (PPRC) bitmap (page 3, lines 25-27).

The invention with respect to claim 3 comprises a method as claimed in claim 1, wherein the first point in time virtual copy is achieved by flashcopying the modified data of the first volume to the second volume (page 11, lines 17-19).

The invention with respect to claim 4 comprises a method as claimed in claim 3, wherein the flashcopying initializes the one or more bits in the first bitmap (page 11, lines 10-13).

The invention with respect to claim 5 comprises a method as claimed in claim 1, wherein the second point in time virtual copy is achieved by flashcopying the modified data of the third volume to the fourth volume (page 13, lines 13-16).

The invention with respect to claim 6 comprises a method as claimed in claim 1, further comprising providing an application host (Fig. 1, 102) that is associated with the first volume for performing the one or more incremental database updates (page 9, lines 3-6; page 10, lines 6-7).

The invention with respect to claim 7 comprises a method as claimed in claim 1, further comprising staggering the one or more incremental database updates during the current database update (page 16, lines 18-19).

The invention with respect to claim 8 comprises a method as claimed in claim 7, wherein the staggering comprises determining whether a synchronization for a previous database update is complete after the destaging is performed for the current database update, and waiting for the synchronization of the previous database update to complete before the performing the first point in time virtual copy for the current database update (page 17, lines 18-27).

The invention with respect to claim 9 comprises a method as claimed in claim 8, wherein the staggering further comprises initializing the first bitmap for a next database update after the performing the first point in time virtual copy for the current database update, and waiting for the next database update after the synchronizing for the current database update (page 18, lines 14-30).

The invention with respect to claim 10 comprises a method as claimed in claim 1, wherein the synchronizing is achieved by establishing a peer to peer remote copy session between the

second volume and the third volume for physically transmitting the modified data of the second volume over the at least one communication link to the third volume (page 10, lines 23-26).

The invention with respect to claim 11 comprises a method as claimed in claim 1, further comprising providing a controller (Figs. 1 and 5, 104) at the primary site for managing access to both the first volume and the second volume, and providing a controller (Figs. 1 and 5, 120) at the remote site for managing access to the third volume and the fourth volume (page 10, lines 11-13 and lines 18-22).

The invention with respect to claim 13 comprises a method as claimed in claim 1, further comprising initializing the first bitmap to indicate that all data on the first volume is to be copied to the second volume, and all data that is copied to the second volume is to be copied to the third volume (page 11, lines 10-21).

The invention with respect to claim 14 comprises a method as claimed in claim 1, further comprising providing a recovery host (Fig. 1, 118) that is associated with the fourth volume for recovering from a failure of the primary site by providing access to the fourth volume (page 10, lines 14-15).

The invention with respect to claim 15 comprises a method as claimed in claim 1, further comprising automatically initiating the incremental database updates (page 12, lines 29-30).

The invention with respect to claim 16 comprises a method as claimed in claim 1, wherein the destaging further comprises inspecting the one or more bits of the first bitmap at the primary site to determine whether the second volume includes data of the one or more tracks on the first volume that are to be overwritten with the modified data, and performing a point in time virtual copy, from the first volume to the second volume, of the data of the one or more tracks on the first volume that are to be overwritten with the modified data if the first bitmap indicates that the

second volume does not include the data of the one or more tracks on the first volume that are to be overwritten with the modified data (page 13, lines 3-13).

The invention with respect to claim 17 comprises a method as claimed in claim 1, wherein the at least one communication link comprises at least one of a channel link, a T1/T3 link, a Fibre channel, and an ESCON link (page 9, lines 25-30).

The invention with respect to claim 18 comprises a system (Fig. 1, 100) for asynchronously transmitting one or more incremental database updates from a primary site (Fig. 1, 101) to a remote site (Fig. 1, 103), the primary site and the remote site interconnected by at least one communication link (Fig. 1, 116), the system comprising means for destaging modified data to a first volume (Fig. 1, 106) at the primary site for a current database update and updating one or more bits in a first bitmap (Fig. 1, 110) at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data (page 12, lines 10-27), first means for performing a point in time virtual copy of the modified data of the first volume to a second volume (Fig. 1, 108) at the primary site by transferring the first bitmap to a second bitmap (Fig. 1, 112) at the primary site for indicating the modified data that is to be transmitted to a third volume (Fig. 1, 122), which is at the remote site, for the current database update (page 11, lines 17-21; page 13, lines 13-19), means for synchronizing the second volume with the third volume for the current database update by transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap (page 11, lines 17-21; page 13, lines 13-19), and second means for performing a point in time virtual copy of the modified data of the third volume to a fourth volume (Fig. 1, 124), which is at the remote site (page 11, lines 17-21; page 13, lines 13-19).

The invention with respect to claim 19 comprises a system as claimed in claim 18, wherein the first bitmap represents a FlashCopy bitmap and the second bitmap represents a peer-to-peer remote copy (PPRC) bitmap (page 3, lines 25-27).

The invention with respect to claim 20 comprises a system as claimed in claim 18, wherein the first means performs a flashcopying of the modified data of the first volume to the second volume (page 11, lines 17-19).

The invention with respect to claim 21 comprises a system as claimed in claim 20, wherein the flashcopying initializes the one or more bits in the first bitmap (page 11, lines 10-13).

The invention with respect to claim 22 comprises a system as claimed in claim 18, wherein the second means performs a flashcopying of the modified data of the third volume to the fourth volume (page 13, lines 13-16).

The invention with respect to claim 23 comprises a system as claimed in claim 18, further comprising an application host (Fig. 1, 102) that is associated with the first volume for performing the one or more incremental database updates (page 9, lines 3-6).

The invention with respect to claim 24 comprises a system as claimed in claim 18, further comprising means for staggering the one or more incremental database updates during the current database update (page 16, lines 18-19).

The invention with respect to claim 25 comprises a system as claimed in claim 24, wherein the means for staggering determines whether a synchronization for a previous database update is complete, after the destaging is performed for the current database update, and waits for the synchronization of the previous database update to complete before the transferring of the first bitmap to the second bitmap for the current database update (page 17, lines 18-27).

The invention with respect to claim 26 comprises a system as claimed in claim 25, wherein the means for staggering initializes the first bitmap for a next database update after the first means performs the point in time virtual copy for the current database update, and waits for the next database update after the means for synchronizing synchronizes the second volume with the third volume for the current database update (page 18, lines 14-30).

The invention with respect to claim 27 comprises a system as claimed in claim 18, wherein the means for synchronizing establishes a peer to peer remote copy session between the second volume and the third volume for physically transmitting the modified data of the second volume over the at least one communication link to the third volume (page 10, lines 23-26).

The invention with respect to claim 28 comprises a system as claimed in claim 18, further comprising means for managing access (Fig. 1, 104) to both the first volume and the second volume, and means for managing access (Fig. 1, 120) to the third volume and the fourth volume (page 10, lines 11-13 and lines 18-22).

The invention with respect to claim 30 comprises a system as claimed in claim 18, further comprising means for initializing the first bitmap to indicate that all data of the first volume is to be copied to the second volume, and all data that is copied to the second volume is to be copied to the third volume (page 11, lines 10-21).

The invention with respect to claim 31 comprises a system as claimed in claim 18, further comprising a recovery host (Fig. 1, 118) that is associated with the fourth volume for recovering from a failure of the primary site by providing access to the fourth volume (page 9, lines 3-6; page 10, lines 14-15).

The invention with respect to claim 32 comprises a system as claimed in claim 18, further comprising means for automatically initiating the incremental database updates (page 12, lines 29-30).

The invention with respect to claim 33 comprises a system as claimed in claim 18, wherein the means for destaging further comprises means for inspecting the one or more bits of the first bitmap at the primary site to determine whether the second volume includes data of the one or more tracks on the first volume that are to be overwritten with the modified data, and means for performing a point in time virtual copy, from the first volume to the second volume, of the data of the one or more tracks on the first volume that are to be overwritten with the modified data if the first bitmap indicates that the second volume does not include the data of the one or more tracks on the first volume that are to be overwritten with the modified data (page 13, lines 3-13).

The invention with respect to claim 34 comprises a system as claimed in claim 18, wherein the at least one communication link comprises at least one of a channel link, a T1/T3 link, a Fibre channel, and an ESCON link (page 9, lines 25-30).

The invention with respect to claim 36 comprises a program storage device, tangibly embodying a program of instructions executable by a machine to perform a method for asynchronously transmitting one or more incremental database updates from a primary site (Fig. 1, 101) to a remote site (Fig. 1, 103), the primary site and the remote site interconnected by at least one communication link (fig. 1, 116), the method comprising (a) destaging modified data to a first volume (Fig. 1, 106) at the primary site for a current database update and updating one or more bits in a first bitmap at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data (page 12, lines 10-27), (b) performing a first point in time virtual copy of the modified data of the first volume to a second volume (Fig. 1, 108) at the

primary site by transferring the first bitmap to a second bitmap at the primary site for indicating the

modified data that is to be transmitted to a third volume (Fig. 1, 122), which is at the remote site,

for the current database update (page 11, lines 17-21; page 13, lines 13-19), (c) synchronizing the

second volume with the third volume for the current database update by transmitting the modified

data of the second volume to the third volume as indicated by the one or more bits in the second

bitmap (page 11, lines 17-21; page 13, lines 13-19), and (d) performing a second point in time

virtual copy of the modified data of the third volume to a fourth volume (Fig. 1, 124), which is at

the remote site (page 11, lines 17-21; page 13, lines 13-19).

The invention with respect to claim 37 comprises a program storage device as claimed in

claim 36, wherein the first bitmap represents a FlashCopy bitmap and the second bitmap represents

a peer-to-peer remote copy (PPRC) bitmap (page 3, lines 25-27).

The invention with respect to claim 38 comprises a program storage device as claimed in

claim 36, wherein the first point in time virtual copy is achieved by flashcopying the modified data

of the first volume to the second volume (page 11, lines 17-19).

The invention with respect to claim 39 comprises a program storage device as claimed in

claim 38, wherein the flashcopying initializes the one or more bits in the first bitmap (page 11,

lines 10-13).

The invention with respect to claim 40 comprises a program storage device as claimed in

claim 36, wherein the second point in time virtual copy is achieved by flashcopying the modified

data of the third volume to the fourth volume (page 13, lines 13-16).

The invention with respect to claim 41 comprises a program storage device as claimed in

claim 36, wherein the method further comprises providing an application host (Fig. 1, 102) that is

associated with the first volume for performing the one or more incremental database updates page 9, lines 3-6; page 10, lines 6-7).

The invention with respect to claim 42 comprises a program storage device as claimed in claim 36, further comprising staggering the one or more incremental database updates during the current database update (page 16, lines 18-19).

The invention with respect to claim 43 comprises a program storage device as claimed in claim 42, wherein the staggering comprises determining whether a synchronization for a previous database update is complete after the destaging is performed for the current database update, and waiting for the synchronization of the previous database update to complete before the performing the first point in time virtual copy for the current database update (page 17, lines 18-27).

The invention with respect to claim 44 comprises a program storage device as claimed in claim 43, wherein the staggering further comprises initializing the first bitmap for a next database update after the performing the first point in time virtual copy for the current database update, and waiting for the next database update after the synchronizing for the current database update (page 18, lines 14-30).

The invention with respect to claim 45 comprises a program storage device as claimed in claim 36, wherein the synchronizing is achieved by establishing a peer to peer remote copy session between the second volume and the third volume for physically transmitting the modified data of the second volume over the at least one communication link to the third volume (page 10, lines 23-26).

The invention with respect to claim 46 comprises a program storage device as claimed in claim 36, wherein the method further comprises providing a controller (Figs. 1 and 5, 104) at the primary site for managing access to both the first volume and the second volume, and providing a

controller (Figs. 1 and 5, 120) at the remote site for managing access to the third volume and the fourth volume (page 10, lines 11-13 and lines 18-22).

The invention with respect to claim 48 comprises a program storage device as claimed in claim 36, wherein the method further comprises initializing the first bitmap to indicate that all data of the first volume is to be copied to the second volume, and all data that is copied to the second volume is to be copied to the third volume (page 11, lines 10-21).

The invention with respect to claim 49 comprises a program storage device as claimed in claim 36, wherein the method further comprises providing a recovery host (Fig. 1, 118) that is associated with the fourth volume for recovering from a failure of the primary site by providing access to the fourth volume (page 10, lines 14-15).

The invention with respect to claim 50 comprises a program storage device as claimed in claim 36, wherein the method further comprises automatically initiating the incremental database updates (page 12, lines 29-30).

The invention with respect to claim 51 comprises a program storage device as claimed in claim 36, wherein the destaging further comprises inspecting the one or more bits of the first bitmap at the primary site to determine whether the second volume includes data of the one or more tracks on the first volume that are to be overwritten with the modified data, and performing a point in time virtual copy, from the first volume to the second volume, of the data of the one or more tracks on the first volume that are to be overwritten with the modified data if the first bitmap indicates that the second volume does not include the data of the one or more tracks on the first volume that are to be overwritten with the modified data (page 13, lines 3-13).

The invention with respect to claim 52 comprises a program storage device as claimed in claim 36, wherein the at least one communication link comprises at least one of a channel link, a T1/T3 link, a Fibre channel, and an ESCON link (page 9, lines 25-30).

The invention with respect to claim 53 comprises a method as claimed in claim 1, wherein during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site (page 10, lines 15-18).

The invention with respect to claim 54 comprises a system as claimed in claim 18, wherein during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site (page 10, lines 15-18).

The invention with respect to claim 55 comprises a program storage device as claimed in claim 36, wherein during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site (page 10, lines 15-18).

The invention with respect to claim 56 comprises a method for backing up data from a primary site (Fig. 1, 101) to a remote site (Fig. 1, 103), comprising (a) destaging modified data to a first volume (Fig. 1, 106) at the primary site for a current database update (page 12, lines 10-27), (b) performing a first point in time virtual copy of the modified data of the first volume to a second volume (Fig. 1, 108), at the primary site (page 11, lines 17-21; page 13, lines 13-19), (c) synchronizing the second volume with a third volume (Fig. 1, 122) at the remote site by transmitting the modified data of the second volume to the third volume (page 12, line 29 to page 13, line 22), and (d) after completion of the synchronizing, performing a second point in time virtual copy of the modified data of the third volume to a fourth volume (Fig. 1, 124) at the remote site, wherein, during the synchronizing, the first volume is accessible to a host at the primary site,

and the fourth volume is accessible to a host at the remote site (page 10, lines 15-18; page 12, line 29 to page 13, line 22).

6. STATEMENT OF THE ISSUES

The issue presented for review is whether claims 1-11, 13-28, 30-34, 36-46 and 48-56, are unpatentable over West et al. in view of Milillo et al.

7. GROUPING OF CLAIMS

The prior art rejections of issue herein apply to more than one claim. These claims stand or fall together.

8. ARGUMENTS

A. The Rejection of claims 1-11, 13-28, 30-34, 36-46 and 48-56, on appeal, under 35 U.S.C. § 103, as being unpatentable over West et al. in view of Milillo et al. is improper.

1. CLAIMS 1, 18, and 36

In an Official Action dated July 28, 2004, the Examiner rejected all pending claims under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,446,176 to West et al. ("West") in view of U.S. Patent No. 6,643,671 to Milillo et al ("Milillo"). In an Amendment and Response, filed October 28, 2004, Appellant amended the claims to point out more clearly the claimed invention and to highlight the differences between the claimed invention and the cited prior art. However, in the Final Official Action, issued May 24, 2005, the Examiner rejected all the pending claims based on the same prior art.

Appellant respectfully disagrees with the Examiner's characterization and

interpretation of the references cited and discussed in the Final Office Action. Because the references do not, in fact, describe what is alleged in the Final Office Action, Appellant submits that the suggestion and motivation to combine these references is improper and that the section 103(a) rejections are defective.

With respect to independent claim 1, the Examiner states that West teaches a system for synchronously transmitting one or more incremental database updates from a primary site to a remote site, the primary site and the remote site interconnected by at least one communication link. Further, the Examiner states the West does not teach any of the other elements of Appellant's independent claim 1.

With respect to independent claim 18, the Examiner states that West teaches a system for asynchronously transmitting one or more incremental database updates from a primary site to a remote site, the primary site and the remote site interconnected by at least one communication link. Further, the Examiner states the West does not teach any of the other elements of Appellant's independent claim 18.

The Examiner further states that at col. 7, lines 38-39, West teaches that not only the "return of status information" but also the "transfer of data" may occur asynchronously, and the update to the database incorporates transferring data.

Appellant submits that the cited passage has been misinterpreted. The cited passage states, in its entirety: "In other words, the transfer of data and the return of status information may occur asynchronously." This passage has been mistakenly interpreted to mean that the transfer of data may occur asynchronously, and the return of status information may occur asynchronously. However, the correct interpretation of this passage is that the transfer of data and the return of status information may occur asynchronously with respect to each other. In other

words, the transfer of data is asynchronous with the return of status information.

For example, West states: "In general, the data transfers proceed with normal status while the true success or failure status is sent asynchronously on a separate transmission back to the primary system." (See col. 6, lines 11-14). Therefore, the status is asynchronous with respect to the data transfers. Furthermore, it is clear that West is only concerned with peer-to-peer remote copy (PPRC), which is a synchronous copy mechanism. (See col. 1, lines 9-15 and lines 28-44) In particular, West states "The present invention relates generally to peer-to-peer remote copy (PPRC) methods and systems...", (See col. 1, lines 9 and 10). Moreover, West further states "Peer-to-peer remote copy (PPRC) is a synchronous copy mechanism that creates a copy of data at a remote or secondary storage system." (See col. 1, lines 28-30).

With respect to independent claim 36, the Examiner states that West teaches a program storage device, tangibly embodying a program of instructions executable by a machine to perform a method for asynchronously transmitting one or more incremental database updates from a primary site to a remote site, the primary site and the remote site interconnected by at least one communication link (col. 4, lines 51-52, lines 64-67; col. 5, lines 1-3). Further, the Examiner states the West does not teach any of the other elements of Appellant's independent claim 36.

The passages cited by the Examiner only discuss a storage system. Nothing is mentioned in West about asynchronously transmitting database updates from a primary site to a remote site.

West does not teach or suggest the invention recited in claims 1, 18, and 36. Specifically, West at least does not teach or suggest asynchronously transmitting database updates from a primary site to a remote site including destaging modified data to a first volume at the primary site for a current database update and updating one or more bits in a first bitmap at the

primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data, performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site by transferring the first bitmap to a second bitmap at the primary site for indicating the modified data that is to be transmitted to a third volume, which is at the remote site, for the current database update, synchronizing the second volume with the third volume for the current database update by transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap, and performing a second point in time virtual copy of the modified data of the third volume to a fourth volume, which is at the remote site.

Instead, West teaches a system and method for transferring data between primary storage and secondary storage using a synchronous copy mechanism.

With respect to independent claims 1, 18, and 36, the Examiner states that Milillo teaches a system and method for synchronizing a data copy using an accumulation remote copy trio consistency group. The Examiner also states that Milillo discloses using a "trio" of a source volume, primary target volume, and a secondary volume (Figs. 2 and 4). Further, the Examiner states that Milillo teaches performing a second point in time virtual copy of the modified data of the third volume to a fourth volume, which is at a remote site (col. 2, lines 7-14 and col. 3, lines 1-33). Appellant submits that the cited passages have been misinterpreted.

The passage cited at col. 2, lines 7-14 discusses migrating a point-in-time copy of data from a source volume to a secondary volume in a PPRC pair. There is no mention of a point in time virtual copy of modified data of a third volume to a fourth volume. Milillo then refers to a system for snapshot copying from a simplex source to a PPRC volume pair by only sending data indicated by accumulated write commands to a secondary system rather than sending the entire

source volume (col. 2, lines 31-42). The passage cited at col. 3, lines 1-33 indicates that such a system could be used in storage systems that comprise multiple source volumes that are to be migrated to a secondary storage system also having multiple volumes. Thus, this passage is only stating that multiple source volumes at a primary subsystem can be migrated to multiple corresponding volumes at a secondary subsystem (Fig. 2), but there is no disclosure or suggestion of performing a second point in time virtual copy of modified data of a third volume that is at a remote site to a fourth volume that is also at the remote site, as claimed by the Appellant.

Further, to rebut Appellant's previous argument that there is no disclosure or suggestion in Milillo of the use of four volumes as set forth in Appellant's claims, the Examiner cited a passage at col. 15, lines 24-31 of Milillo in the Final Office Action (see pages 21-22, paragraph 4). This cited passage states: "While the present invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description." Moreover, the Examiner states that "It would be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention, such as adding a fourth volume" (see page 22, paragraph 1).

However, one cannot base obviousness upon what a person skilled in the art could, or might, try but rather must consider what the prior art would have led a person skilled in the art to do. In re Antonie, 559 F.2d 618 195 USPQ 6 (CCPA, 1977). The conclusion asserted by the Examiner represents an impermissible use of hindsight gained from the present invention. In fact, the cited passage is only boilerplate language that is included in most patent applications. The passage provides no specific teaching whatsoever.

Milillo does not teach or suggest the system recited in claims 1, 18, and 36. Specifically, Milillo at least does not teach or suggest <u>asynchronously</u> transmitting database updates from a primary site to a remote site including destaging modified data to a first volume at the primary site for a current database update and updating one or more bits in a first bitmap at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data, performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site by transferring the first bitmap to a second bitmap at the primary site for indicating the modified data that is to be transmitted to a third volume, which is at the remote site, for the current database update, synchronizing the second volume with the third volume for the current database update by transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap, and <u>performing a second point in time virtual copy of the modified data of the third volume to a fourth volume, which is at the remote site.</u>

In view of the foregoing, it is respectfully submitted that West and Milillo, whether taken alone or in combination, do not teach or suggest the subject matter recited in claims 1, 18, and 36.

Further, combining West and Milillo is improper because each of these references fails to suggest or disclose a motivation for combining the references.

The U.S. Court of Appeals for the Federal Circuit (the "Federal Circuit") has consistently and repeatedly stated the legal test applicable to rejections under 35 U.S.C. § 103(a) Recently (*In re Rouffet*, 47 USPQ2d 1453 (Fed. Cir., July 15, 1998)), the Court stated:

> [V]irtually all [inventions] are combinations of old elements. Therefore
> an Examiner may often find every element of a claimed invention in the prior
> art. Furthermore, rejecting patents solely by finding prior art corollaries for the

claimed elements would permit an Examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be "an illogical and inappropriate process by which to determine patentability." To prevent the use of hind sight based on the invention to defeat patentability of the invention, this court requires the Examiner to show a motivation to combine the references that create the case of obviousness. The Board [of Appeals] did not, however, explain what specific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination. Instead, the Board merely invoked the high level of skill in the field of the art. If such a rote indication could suffice to supply a motivation to combine, the more sophisticated scientific fields would rarely, if ever, experience a patentable technical advance. Instead, in complex scientific fields, the Board could routinely identify the prior art elements in an application, invoke the lofty level of skill, and rest its case for rejection. To counter this potential weakness in the obviousness construct **the suggestion to combine requirements stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.**

> *In re Rouffet*, 47 USPQ2d 1457-58 (Fed. Cir., July 15, 1998)
> (citations omitted, emphasis added).

More recently, the Federal Circuit again dealt with what is required to show a

motivation to combine references under 35 U.S.C. § 103(a). In this case the court reversed the

decision of the Board of appeals stating:

> [R]ather then pointing to specific information in Holiday or Shapiro that suggest the combination..., the Board instead described in detail the similarities between the Holiday and Shapiro references and the claimed invention, noting that one reference or the other-in combination with each other... described all of the limitations of the pending claims. Nowhere does the Board particularly identify any suggestion, teaching, or motivation to combine the ... references, nor does the Board make specific-or even inferential-findings concerning the identification of the relevant art, the level of ordinary skill in the art, the nature of the problem to be solved, or any factual findings that might serve to support a proper obviousness analysis.

> *In re Dembiczak*, 50 USPQ2d 1614, 1618 (Fed. Cir., April 28, 1999)
> (citations omitted).

Thus, from both *In re Rouffet* and *In re Dembiczak* it is clear that the Federal

Circuit requires a specific identification of a suggestion, motivation, or teaching why one of

ordinary skill in the art would have been motivated to select the references and combine them. This the Examiner has not done.

The Examiner states one reason for the suggestion and motivation to combine West and Milillo at col. 3, lines 19-28, which reads: "Such a system and method could also be employed in storage systems that comprise multiple source volumes, each associated with an established PPRC pair. In that regard, users increasingly have databases that span multiple source volumes, and would like to migrate data to a secondary storage system also having multiple volumes for disaster recovery purposes as described above. Such migration should be as quick as possible to facilitate smaller incremental backups." This passage specifically refers to PPRC, which is a synchronous copy mechanism that creates a copy of data at a remote or secondary storage system. In contrast, Appellant's invention recites a system and method for an <u>asynchronous</u> incremental database update at a primary site to remote recovery site, which completely decouples database updates at the primary site from the transmission of the database updates to the remote recovery site (through the use of four volumes), thereby facilitating efficient data backup and disaster recovery.

Therefore, those skilled in the art would not be motivated or suggested to look to either West or Milillo to solve the objective addressed by the present invention. The only test to be applied when considering obviousness is whether there is a motivation or suggestion to combine the references. As discussed above, the Examiner has not made such a showing, either in the references themselves or in the art in general

In light of the state of the law as set forth by the Federal Circuit and the Examiner's mischaracterization of the cited references both individually, and with regard to the motivation to combine the cited references, the Appellant respectfully submits that the rejections for obviousness

under 35 U.S.C. § 103(a) lack the requisite motivation and must be withdrawn.

2. CLAIMS 11, 13-17, 19-28, 30-34, 37-46, and 48-55

Claims 2-11, 13-17, 19-28, 30-34, 37-46, and 48-55, which depend directly or indirectly from the independent claims 1, 18, and 36 incorporate all of the limitations of the corresponding independent claim and are therefore patentably distinct over West et al. in view of Milillo et al. for at least those reasons provided for claims 1, 18, and 36.

3. CLAIM 56

The Examiner states that West teaches that during synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site (abstract; col. 1, lines 45-52, lines 58-67; col. 2, lines 1-2, 17-24).

The passages cited refer only to a host writing data to a primary storage system and a secondary storage system. Nothing related to a fourth volume is described. Appellant's invention teaches writing data from a first volume to a second volume, from the second volume to a third volume, and from the third volume to a fourth volume, which is at a remote site.

West does not teach or suggest the system recited in claim 56. Specifically, West at least does not teach or suggest a method for backing up data from a primary site to a remote site including destaging modified data to a first volume at the primary site for a current database update, performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site, synchronizing the second volume with a third volume at the remote site by transmitting the modified data of the second volume to the third volume, and after completion of the synchronizing, performing a second point in time virtual copy of the modified data of the third volume to a fourth volume at the remote site; wherein, during the synchronizing,

the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site.

Instead, West teaches a system and method for transferring data between primary storage and secondary storage using a PPRC synchronous copy mechanism.

Milillo has been previously discussed above and does not teach or suggest the system recited in claim 56. Specifically, Milillo at least does not teach or suggest a method for backing up data from a primary site to a remote site including destaging modified data to a first volume at the primary site for a current database update, performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site, synchronizing the second volume with a third volume at the remote site by transmitting the modified data of the second volume to the third volume, and after completion of the synchronizing, performing a second point in time virtual copy of the modified data of the third volume to a fourth volume at the remote site; wherein, during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site. Instead, Milillo teaches a system and method for synchronizing a data copy using an accumulation remote copy trio consistency group, which includes a source volume, primary target volume, and a secondary volume.

In view of the foregoing, it is respectfully submitted that West and Milillo, whether taken alone or in combination, do not teach or suggest the subject matter recited in claim 56.

Further, combining West and Milillo is improper because each of these references fails to suggest or disclose a motivation for combining the references, as described in detail above in connection with the independent claims 1, 18, and 36.

9. <u>CONCLUSION</u>

Based on the above arguments and remarks, Appellant respectfully submits that the claims

of the instant invention on appeal are not obvious in light of West et al. and Milillo et al., either

individually or in combination. Consequently, the rejections of the claims based on such

references are in error. In view of the remarks submitted hereinabove, the references applied

against Claims 1-11, 13-28, 30-34, 36-46 and 48-56 on appeal do not render those claims

unpatentable under 35 U.S.C. § 103(a). Thus, Appellant submits that the § 103 rejections are in

error and must be reversed.

Respectfully submitted,

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CLAIMS ON APPEAL: CLAIMS 1-11, 13-28, 30-34, 36-46 and 48-56
Application Serial No. 10/079,458

1. (Rejected)   A method for asynchronously transmitting one or more incremental database updates from a primary site to a remote site, the primary site and the remote site interconnected by at least one communication link, the method comprising:

(a) destaging modified data to a first volume at the primary site for a current database update and updating one or more bits in a first bitmap at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data;

(b) performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site by transferring the first bitmap to a second bitmap at the primary site for indicating the modified data that is to be transmitted to a third volume, which is at the remote site, for the current database update;

(c) synchronizing the second volume with the third volume for the current database update by transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap; and

(d) performing a second point in time virtual copy of the modified data of the third volume to a fourth volume, which is at the remote site.

2. (Rejected)   The method of Claim 1, wherein the first bitmap represents a FlashCopy bitmap and the second bitmap represents a peer-to-peer remote copy (PPRC) bitmap.

3. (Rejected)   The method of Claim 1, wherein the first point in time virtual copy is achieved by flashcopying the modified data of the first volume to the second volume.

4. (Rejected)   The method of Claim 3, wherein the flashcopying initializes the one or more bits in the first bitmap.

5. (Rejected)   The method of Claim 1, wherein the second point in time virtual copy is achieved by flashcopying the modified data of the third volume to the fourth volume.

6. (Rejected)   The method of Claim 1, further comprising providing an application host that is associated with the first volume for performing the one or more incremental database updates.

7. (Rejected)   The method of Claim 1, further comprising staggering the one or more incremental database updates during the current database update.

8. (Rejected)   The method of Claim 7, wherein the staggering comprises:

    determining whether a synchronization for a previous database update is complete after the destaging is performed for the current database update; and

    waiting for the synchronization of the previous database update to complete before the performing the first point in time virtual copy for the current database update.

9. (Rejected)   The method of claim 8, wherein the staggering further comprises:

initializing the first bitmap for a next database update after the performing the first point in time virtual copy for the current database update; and

waiting for the next database update after the synchronizing for the current database update.

10. (Rejected)   The method of Claim 1, wherein the synchronizing is achieved by establishing a peer to peer remote copy session between the second volume and the third volume for physically transmitting the modified data of the second volume over the at least one communication link to the third volume.

11. (Rejected)   The method of Claim 1, further comprising providing a controller at the primary site for managing access to both the first volume and the second volume; and

providing a controller at the remote site for managing access to the third volume and the fourth volume.

13. (Rejected)   The method of Claim 1, further comprising:

initializing the first bitmap to indicate that all data on the first volume is to be copied to the second volume, and all data that is copied to the second volume is to be copied to the third volume.

14. (Rejected)   The method of Claim 1, further comprising providing a recovery host that is associated with the fourth volume for recovering from a failure of the primary site by providing access to the fourth volume.

15. (Rejected)   The method of Claim 1, further comprising automatically initiating the incremental database updates.

16. (Rejected)   The method of Claim 1, wherein the destaging further comprises:

inspecting the one or more bits of the first bitmap at the primary site to determine whether the second volume includes data of the one or more tracks on the first volume that are to be overwritten with the modified data; and

performing a point in time virtual copy, from the first volume to the second volume, of the data of the one or more tracks on the first volume that are to be overwritten with the modified data if the first bitmap indicates that the second volume does not include the data of the one or more tracks on the first volume that are to be overwritten with the modified data.

17. (Rejected)   The method of Claim 1, wherein the at least one communication link comprises at least one of a channel link; a T1/T3 link; a Fibre channel; and an ESCON link.

18. (Rejected)   A system for asynchronously transmitting one or more incremental database updates from a primary site to a remote site, the primary site and the remote site interconnected by at least one communication link, the system comprising:

means for destaging modified data to a first volume at the primary site for a current database update and updating one or more bits in a first bitmap at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data;

first means for performing a point in time virtual copy of the modified data of the first

volume to a second volume at the primary site by transferring the first bitmap to a second bitmap

at the primary site for indicating the modified data that is to be transmitted to a third volume,

which is at the remote site, for the current database update;

means for synchronizing the second volume with the third volume for the current database

update by transmitting the modified data of the second volume to the third volume as indicated by

the one or more bits in the second bitmap; and

second means for performing a point in time virtual copy of the modified data of the third

volume to a fourth volume, which is at the remote site.

19. (Rejected) The system of Claim 18, wherein the first bitmap represents a FlashCopy

bitmap and the second bitmap represents a peer-to-peer remote copy (PPRC) bitmap.

20. (Rejected) The system of Claim 18, wherein the first means performs a flashcopying of the

modified data of the first volume to the second volume.

21. (Rejected) The system of Claim 20, wherein the flashcopying initializes the one or more

bits in the first bitmap.

22. (Rejected) The system of Claim 18, wherein the second means performs a flashcopying of

the modified data of the third volume to the fourth volume.

23. (Rejected) The system of Claim 18, further comprising an application host that is associated with the first volume for performing the one or more incremental database updates.

24. (Rejected) The system of Claim 18, further comprising means for staggering the one or more incremental database updates during the current database update.

25. (Rejected) The system of Claim 24, wherein the means for staggering determines whether a synchronization for a previous database update is complete, after the destaging is performed for the current database update, and waits for the synchronization of the previous database update to complete before the transferring of the first bitmap to the second bitmap for the current database update.

26. (Rejected) The system of claim 25, wherein the means for staggering initializes the first bitmap for a next database update after the first means performs the point in time virtual copy for the current database update, and waits for the next database update after the means for synchronizing synchronizes the second volume with the third volume for the current database update.

27. (Rejected) The system of Claim 18, wherein the means for synchronizing establishes a peer to peer remote copy session between the second volume and the third volume for physically transmitting the modified data of the second volume over the at least one communication link to the third volume.

28. (Rejected)   The system of Claim 18, further comprising means for managing access to both the first volume and the second volume; and

means for managing access to the third volume and the fourth volume.

30. (Rejected)   The system of Claim 18, further comprising:

means for initializing the first bitmap to indicate that all data of the first volume is to be copied to the second volume, and all data that is copied to the second volume is to be copied to the third volume.

31. (Rejected)   The system of Claim 18, further comprising a recovery host that is associated with the fourth volume for recovering from a failure of the primary site by providing access to the fourth volume.

32. (Rejected)   The system of Claim 18, further comprising means for automatically initiating the incremental database updates.

33. (Rejected)   The system of Claim 18, wherein the means for destaging further compromises:

means for inspecting the one or more bits of the first bitmap at the primary site to determine whether the second volume includes data of the one or more tracks on the first volume that are to be overwritten with the modified data; and

means for performing a point in time virtual copy, from the first volume to the second volume, of the data of the one or more tracks on the first volume that are to be overwritten with the

modified data if the first bitmap indicates that the second volume does not include the data of the one or more tracks on the first volume that are to be overwritten with the modified data.

34. (Rejected) The system of Claim 18, wherein the at least one communication link comprises at least one of a channel link; a T1/T3 link; a Fibre channel; and an ESCON link.

36. (Rejected) A program storage device, tangibly embodying a program of instructions executable by a machine to perform a method for asynchronously transmitting one or more incremental database updates from a primary site to a remote site, the primary site and the remote site interconnected by at least one communication link, the method comprising:

(a) destaging modified data to a first volume at the primary site for a current database update and updating one or more bits in a first bitmap at the primary site that indicate one or more tracks on the first volume that are to be overwritten with the modified data;

(b) performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site by transferring the first bitmap to a second bitmap at the primary site for indicating the modified data that is to be transmitted to a third volume, which is at the remote site, for the current database update;

(c) synchronizing the second volume with the third volume for the current database update by transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap; and

(d) performing a second point in time virtual copy of the modified data of the third volume to a fourth volume, which is at the remote site.

37. (Rejected) The program storage device of Claim 36, wherein the first bitmap represents a FlashCopy bitmap and the second bitmap represents a peer-to-peer remote copy (PPRC) bitmap.

38. (Rejected) The program storage device of Claim 36, wherein the first point in time virtual copy is achieved by flashcopying the modified data of the first volume to the second volume.

39. (Rejected) The program storage device of Claim 38, wherein the flashcopying initializes the one or more bits in the first bitmap.

40. (Rejected) The program storage device of Claim 36, wherein the second point in time virtual copy is achieved by flashcopying the modified data of the third volume to the fourth volume.

41. (Rejected) The program storage device of Claim 36, wherein the method further comprises providing an application host that is associated with the first volume for performing the one or more incremental database updates.

42. (Rejected) The program storage device of Claim 36, further comprising staggering the one or more incremental database updates during the current database update.

43. (Rejected) The program storage device of Claim 42, wherein the staggering comprises:

      determining whether a synchronization for a previous database update is complete after the destaging is performed for the current database update; and

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waiting for the synchronization of the previous database update to complete before the

performing the first point in time virtual copy for the current database update.

44.   (Rejected)   The program storage device of Claim 43, wherein the staggering further

comprises:

initializing the first bitmap for a next database update after the performing the first point in

time virtual copy for the current database update; and

waiting for the next database update after the synchronizing for the current database

update.

45.   (Rejected)   The program storage device of Claim 36, wherein the synchronizing is achieved

by establishing a peer to peer remote copy session between the second volume and the third

volume for physically transmitting the modified data of the second volume over the at least one

communication link to the third volume.

46.   (Rejected)   The program storage device of Claim 36, wherein the method further comprises

providing a controller at the primary site for managing access to both the first volume and the

second volume; and

providing a controller at the remote site for managing access to the third volume and the

fourth volume.

48.   (Rejected)   The program storage device of Claim 36, wherein the method further comprises:

initializing the first bitmap to indicate that all data of the first volume is to be copied to the second volume, and all data that is copied to the second volume is to be copied to the third volume.

49.   (Rejected)   The program storage device of Claim 36, wherein the method further comprises providing a recovery host that is associated with the fourth volume for recovering from a failure of the primary site by providing access to the fourth volume.

50.   (Rejected)   The program storage device of Claim 36, wherein the method further comprises automatically initiating the incremental database updates.

51.   (Rejected)   The program storage device of Claim 36, wherein the destaging further comprises:

inspecting the one or more bits of the first bitmap at the primary site to determine whether the second volume includes data of the one or more tracks on the first volume that are to be overwritten with the modified data; and

performing a point in time virtual copy, from the first volume to the second volume, of the data of the one or more tracks on the first volume that are to be overwritten with the modified data if the first bitmap indicates that the second volume does not include the data of the one or more tracks on the first volume that are to be overwritten with the modified data.

52. (Rejected) The program storage device of Claim 36, wherein the at least one communication link comprises at least one of a channel link; a T1/T3 link; a Fibre channel; and an ESCON link.

53. (Rejected) The method of claim 1, wherein during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site.

54. (Rejected) The system of claim 18, wherein during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site.

55. (Rejected) The program storage device of claim 36, wherein during the synchronizing, the first volume is accessible to a host at the primary site, and the fourth volume is accessible to a host at the remote site.

56. (Rejected) A method for backing up data from a primary site to a remote site, comprising:

(a) destaging modified data to a first volume at the primary site for a current database update;

(b) performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site;

(c) synchronizing the second volume with a third volume at the remote site by transmitting the modified data of the second volume to the third volume; and

(d) after completion of the synchronizing, performing a second point in time virtual copy of

the modified data of the third volume to a fourth volume at the remote site;

wherein, during the synchronizing, the first volume is accessible to a host at the primary site, and

the fourth volume is accessible to a host at the remote site.